

AMICIBDELLA AND MICOBDELLA GEN. NOV. OF EASTERN
AUSTRALIA (HIRUDINOIDEA: HAEMADIPSIDAE S.L.)

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ABSTRACT

Two new genera and three new species are described. *Amicibdella niger* sp.nov.: 5-annulate; contrast stripes lateral in the paramedian fields and along the lines of the supramarginal sense organs; nephropores in a dark band in the marginal fields; northeastern Queensland. Categories are defined for individual variations in pattern, and three forms of tertiary variation described for *A. niger*. *Micobdella gloriosi* sp.nov.: 4-annulate, contrast stripes in the dorsal median field, lateral in each intermediate field extending into the line of the supramarginal sense organs; nephropores in a dark band in the marginal fields; annuli of the midnephric somites equal in length; southeastern Queensland. *Micobdella auritus* sp.nov.: annuli of midnephric somites unequal in length; Sydney, N.S.W. *Micobdella* sp.?, (?) Tasmania.

Modification of the paramedian and intermediate palisades of dorsoventral muscles due to the ventral reduction of xxiii to xxvii, is briefly described.

Topographically defined pattern is proposed as a guide to generic separations among species exhibiting close morphological similarity.

This paper provides two new genera for eastern Australian land-leeches. One is 5-annulate, known only in the type species in northern Queensland; the second, 4-annulate, based on a species in southern Queensland, is represented by a second species in Sydney, N.S.W., and a specimen recorded as from Tasmania. The latter locality is possibly doubtful.

The two genera are defined in a combination of external and internal characteristics. Each has a distinctive pattern, as in other genera I have defined in this manner.

Preserved specimens of the 5-annulate show marked variation in individual pattern. In describing this, I differentiate the principle forms of individual variation in pattern as known to me in Australian Haemadipsidae, some forms having such high frequency as to be characteristic of the species and systematic in value, as in this 5-annulate.

The Haemadipsidae occur in the Oriental, Australian, Oceanic, and Malagasian zoogeographic divisions. As known the family has been small, containing (Soos, 1967) 31 species in 9 genera, three of the genera based on Australian species with a fourth genus in Papua based on an Oriental species. Elsewhere, I will add two other new genera for Papua. Below, I give indications for other new genera in eastern Australia.

The diversity here is adequate for the testing of the principles on which the family had long been systematized.

One such principle has been that pattern is so highly variable as to be without systematic value (v. Blanchard, 1917). This was formulated in earlier practice in which 'genera' were characterized essentially on simple external meristic morphology. Such genera are

heterogenous in content, present zoogeographic anomalies, and are zoologically inadequate (Soos, 1967; Richardson, 1969, 1971).

I review elsewhere (*Mem. Nat. Mus. Vict.* 35) in more detail, the development of the concept of 'genus' in the Haemadipsidae. Briefly, early genera (*Haemadipsa* Tennent 1859, Oriental; *Chtonobdella* Grube, 1866, Australian) were defined on the nature of the ocular arch, the total number of annuli, and the number of annuli between the genital pores. Then, following Whitman, from 1893 to 1897, by Blanchard on the number of annuli in the fully annulate somite (*Mesobdella*, 3-annulate, Neotropical; *Planobdella*, 7-annulate and *Phytobdella*, 6-annulate, Oriental; *Philaemon*, 4-annulate, Australian) and species separated on the number of annuli between the genital pores or other detail in general somital annulation. Blanchard (1917) reduced *Chtonobdella* to synonymy under *Haemadipsa*, both being 5-annulate, although *Haemadipsa* was based on a trignathous leech. Blanchard's system (1917) continues to dominate the greater part of the Haemadipsidae (v. Soos, 1967).

A sound basis for departure from that system was provided by Miss A. M. Lambert (1898) in her closely detailed account of the morphology of *Philaemon pungens*, showing this to be duognathous, the postcaeca terminating in distinctive organs, now the lambertian organs, as also (1899) the same characteristics in two 5-annulate species in Australia.

Using this, Harding (1913) defined *Idiobdella* (Seychelle Is.): 5-annulate, duognathous, $11\frac{1}{2}$ annuli between the genital pores, lacking auricles and lambertian organs; Augener (1931) revalidated *Chtonobdella* as duognathous; Moore (1938) defined *Tritetrabdella* (Malay Peninsula): 4-annulate, trignathous, lacking lambertian organs; Nybelin (1943), *Nesophilaemon* (Juan Fernandez): 4-annulate, duognathous, lacking lambertian organs. *Idiobdella*, *Tritetrabdella*, *Nesophilaemon*, are monotypic.

Adding to these criteria the annulation of the somites anterior and posterior to the fully annulate series, and the morphology of the auricle, I established (1969) *Neoterrabdella* (Northern Territory): 4-annulate, duognathous, lacking lambertian organs, exceptional in having xxiv 3-annulate, xxv 2-annulate, and the auricles on xxiv to xxvii. *Neoterrabdella* is monotypic.

I demonstrated also the distinctive morphology of the reproductive systems in the Haemadipsidae, and on this basis removed *Nesophilaemon*, and later (1971) *Mesobdella* from this family.

Criteria of systematic significance additional to those above, are introduced in the present paper: jaws armed with an edentulous cutting ridge; salivary gland papillae on the jaws of the 5-annulate '*Geobdella*' *whitmani* Lambert 1899; a count of the annuli posterior to xxiii a₂, since xxiv commonly lacks detectable somital sense organs and the annulation of these two somites cannot always be determined with full confidence; the form, location, and the relative lengths of the lambertian organs and their ducts; the relative lengths of the two limbs of the primary loop of the female median region; and topographically defined pattern. In various combinations, these have generic value.

I show here for the first time in the Haemadipsidae, a separation of species on the relative lengths of the annuli in the mid-nephric somites.

With progress toward a more precise concept of genus and of species in the Haemadipsidae, variation in pattern in the individuals of a species can be closely analysed, categorized,

and utilized systematically.

Additional to those genera which can be separated on morphological grounds, there are in the eastern Australian Haemadipsidae assemblies of 4- and of 5-annulate species which are closely similar morphologically and cannot be separated in this manner.

Each assembly contains groups of species, the groups exhibiting differences in the topography of pattern of the same order as the differences in the distinctive patterns of those genera which have been defined on combinations of external and internal morphological characteristics.

This indicates that the knowledge of the systematic morphology of the Haemadipsidae is still incomplete; but I continue unable to locate and fill these gaps.

Unless there is acceptance of the principle that topographically defined pattern is in itself a reliable indication for the separation of genera among these assemblies in eastern Australia, the result will be a division of the Haemadipsidae here into genera, some defined on morphological terms and each with its distinctive pattern; and others in which pattern will be diversified and without systematic meaning as in the zoologically inadequate 'genera' of Blanchard.

This paper brings us to the point where the acceptance of the principle is warranted.

Amicibdella gen. nov.

DERIVATION: *amicus*, friendly; *bdella*, a leech, m.

Haemadipsidae; duognathous; lacking salivary gland papillae; somites ix to xxii, 5-annulate (total 14); viii and xxiii, 4-annulate; xxiv, 2-annulate; 7 annuli posterior to xxiii a_2 ; auricles posterior to xxiv, the margin lobed; wide contrast stripes lateral in the paramedian fields, narrow contrast stripes along the lines of the supramarginal somital sense organs; nephropores included in a wide dark band extending across the marginal and submarginal fields and including the submarginal and ventral intermediate somital sense organs; teeth minute, a nearly uniform row of about 95; pharynx terminates at viii/ix; lambertian organs, posterior, each about twice the length of its duct; genital pores, xi b_5/b_6 , xiii b_1/b_2 ; reproductive systems, haemadipsoid: anterior region of male paired ducts reflected as a single primary loop in the median splanchnic chamber, a sperm duct on the procurrent or on both limbs; ejaculatory bulbs, present; median regions, hemimyomeric, the male a micromorphic atrium, the female formed on a posteriorly directed loop, the limbs equivalent in length, and the loop extended posteriorly as an oviducal glandular sac.

TYPE SPECIES: *Amicibdella niger* sp. nov. as below.

Amicibdella is characterized by: the absence of a contrast stripe in the dorsal median field; by the presence of a contrast stripe lateral in each paramedian field from in v to xxvii, the stripe including the intermediate sense organs along the posterior half of the body; by a narrow contrast stripe along and restricted to each line of supramarginal somital sense organs from in vi to in xxiv; by a dark band occupying the marginal and ventral intermediate fields from in v to in xxv, the band including the submarginal sense organs along its length, the ventral intermediate sense organs anteriorly, and the nephropores which are in the marginal field.

It differs in general somital annulation from a 5-annulate genus in Papua, (*Mem. Nat. Mus. Vict.* 35) which has viii to xxiii 5-annulate (total 16); vii, incomplete 5-annulate; the lateral margin of the auricle, straight.

The general external meristic morphology and the internal morphology of *Amicibdella* is the same as in the other 5-annulates of eastern Australia. The majority of these have a contrast stripe in the dorsal median field from in iii (or shorter in some, from in ix) to in xxii or xxiii; a stripe lateral in the paramedian field from in v to in xxiv; some with one stripe in the medial half of the dorsal intermediate field, others with this stripe and a second stripe in the lateral half of this field, from in vi to in xxiii, xxiv, or xxv; the stripes of the paramedian and intermediate fields complete to much broken represented only by short to longer patches; a stripe in the ventral half of the marginal field, usually complete from the velum to the auricle, expanding into the dorsal half of this field as a lobe on the nephroporic annulus, the lobe including the nephropore which is in the marginal field.

Leeches in this assembly are known to me from southern Queensland, south to beyond Sydney, N.S.W. Moore (1944) and myself (Richardson, 1967, 1968a, b; Richardson and Hunt, 1968) were misled by Blanchard (1917) to identify leeches in this assembly as *Chtonobdella limbata* Grube, 1866.

'*Geobdella*' *whitmani* Lambert 1899 of southern Queensland is the only described leech in this assembly. I find it has salivary gland papillae on the jaws, not known previously in the Haemadipsidae. The median dorsal stripe terminates in xxi; a single stripe in each intermediate field, commonly broken into patches commencing and terminating on a_2 ; a stripe in the marginal field from the velum to the auricle, has straight edges, fills the field, and includes the nephropores. A new genus will be provided elsewhere for *whitmani*.

The 5-annulates lacking a dorsal median stripe are known to me only from north-eastern Queensland, and from eastern New South Wales south of Sydney.

Those in New South Wales are *Chtonobdella limbata* Grube 1866. I have studied the types and recently collected material. '*Geobdella*' *australiensis* Lambert 1899 is a synonym of *limbata*.

In *C. limbata* (v. Lambert, 1899) the dorsal pattern is restricted to the posterior end of the body, from xx/xxi to xxiii/xxiv: a single patch (gold in life) on each side of the midline on the contiguous annuli of xxi and xxii, also on these annuli for xxii and xxiii, and also on the posterior annuli of xxiii; a pair of patches in both intermediate fields at the same levels as the anterior and middle patches in the paramedian fields, together forming distinct transverse rows; a stripe (red in life) lateral in each paramedian field from xx/xxi into the anterior half of xxiii; erratic white patches in xxiv; a stripe in the ventral half of the marginal field from the velum to xxiii/xxiv, expanding dorsally on the nephroporic annuli as a lobe including the nephropore.

***Amicibdella niger* sp. nov.**

(Figures 1, 2, 3)

HOLOTYPE: Preserved, 52.0 mm long. Herberton Range, north of the main road from Herberton to Atherton, North Queensland, map reference (1:100,000) CA 319850; Grassy clearing in rain-forest; Alt., 2,000 m; May 4, 1973; Collector, W. Whiteman; Per J. W. Winter. Dissected. Deposited: Queensland Museum, G5310.

PARATYPE: Preserved, 38.5 mm long. Herberton Range, north Queensland, map reference (1:100,000) CA 310980; grassy forest grading into wet sclerophyll; alt., 1,200 m; May 29, 1973; collector, J. Winter. Dissected, right ventrolateral jaw removed, mounted separately. Deposited: Australian Museum, Sydney, W4305.

DESCRIPTION OF HOLOTYPE (For details of the teeth, refer to the paratype description.)

GENERAL FORM: Moderately large; maximum extension in life, 55.0 mm.

Preserved, extended, 52.0 mm long; elongate tapering cylindrical, widest along the posterior half of the body, the width equal to the depth, reducing gradually anteriorly in width and depth to the narrow anterior sucker, more abruptly posteriorly to the sucker which is about two-thirds the maximum width of the body.

Total length, 52.0 mm; the width and depth, 2.0 mm at v/vi; 4.5 mm at x/xi, 10.0 mm from the tip of the velum; 6.0 mm at xiv/xv, 20.0 mm from the tip; 6.5 mm at xvii/xviii, 30.0 mm from the tip; 7.0 mm at xx/xxi, and posteriorly to 45.0 mm; reducing to the basis (4.0 mm) of the posterior sucker which is 5.0 mm in diameter.

COLOUR: In life: the dorsum black with a pair of wide-spaced longitudinal contrast stripes, golden along the greater length of the body, pale green at the anterior and posterior ends, extending onto the dorsum of the posterior sucker to enclose a black postanal patch; these stripes expanding briefly at regular intervals and wider on the posterior portion of the body. Lateral to these golden stripes, a wide reddish brown band maculated with dark brown on the posterior portion of the body extends onto the venter, the upper and lower borders of the band maculated. A very narrow gold stripe with straight margins divides the reddish brown band along the length of the body. The venter, light brownish, immaculate between the reddish brown bands.

Preserved in formalin: The black of the dorsum diminishes in intensity; a narrow pale brownish median dorsal band with irregular dark margins becomes vaguely indicated; green disappears from the paired dorsal stripes which, as also the outer stripes reduce to yellow; the paired reddish brown bands reduce to a pale brown with obvious dark brown maculation along both margins; the venter becomes a pale yellow.

PATTERN (Figs. 1, A-E): The wide median dorsal black band fills the ocular arch in ii to iv; in v posteriorly to in xxvii, the band includes the lines of the paramedian somital sense organs, extends across the medial half of the paramedian fields, and is represented by the postanal patch on the dorsum of the sucker.

The inner paired wide contrast stripes occupy the lateral half of the paramedian fields from in v to ix, progressively posterior to this expanding on a_2 , then on b_2 , a_2 , b_5 , to contact and then to include the sense organs of the intermediate lines from xv posteriorly, and to briefly enter the intermediate fields.

The outer paired narrow contrast stripes occupy and are restricted to the lines of the supramarginal sense organs from in vi to xxiv/xxv dividing the side paired bands into dorsal and marginal elements.

The dorsal element occupies the dorsal intermediate field from in vi to xxiii with the intermediate somital sense organs included marginally on the anterior portion of the body.

The marginal element is defined as such from in vi to xxiv/xxv; occupies the marginal field, includes the nephropores which are in this field, the lines of both submarginal and ventral intermediate sense organs and the ventral intermediate field on the anterior portion of the body, but only the lateral half of this field on the posterior portion of the body.

ANNULATION (Figs. 1, A-F): In life, moderately areolate; extended, preserved, areolae weakly defined. Somital and intersomital furrows equivalent; somital limits not directly recognizable; somital sense organs, each enclosed in a small white disc, generally

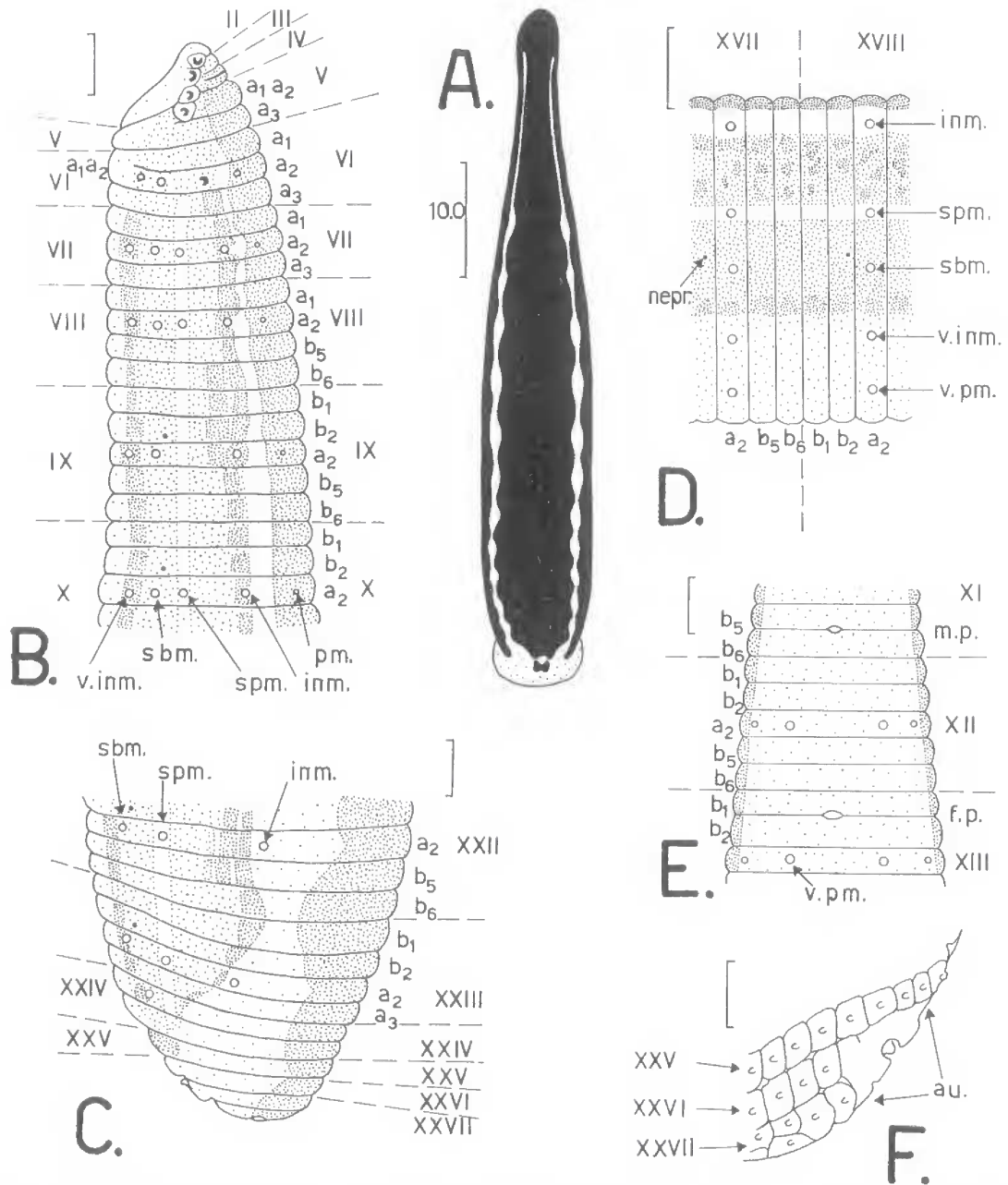


FIG. 1: *Amicibdella niger* gen. et sp. nov. Holotype. A, general form and dorsal pattern, showing contrast stripes in the paramedian fields. B, lateral aspect showing somital annulation of somites i to x, and detailed topography of pattern. C, the same, somites xxii to xxvii. D, the same, somites xvii and xviii. E, ventral aspect, somites xi into xiii. F, right auricle, dorsal view.

Somites and somital ganglia indicated by roman numerals; somital limits, by broken lines; annuli, 'a₂', etc.; somital ganglia represented at relative size. Scales in millimeters, 1.0 mm, or as indicated.

Abbreviations: an.gr., annular groove; at., atrium; au., auricle; cr., crop; dm.r., dorsomedian muscular ridge; ej.b., ejaculatory bulb; f.p., female pore; inm., intermediate somital sense organ; j.,

obvious as transverse and longitudinal series; sensillae, minute white points, central in the areolae, nephropores, located in the marginal field, generally obscure minute apertures in the posterior half of b_2 immediately dorsal to the level of the submarginal sense organ on a_2 ; width of the dorsal median field in xvi = half the width of the somite.

Somites ii and iii, uniannulate with the 1st and 2nd pairs of eyes, each eye in an ocular areola, the furrow ii/iii extending between these areolae, and iii with the 1st pair of paramedians; the 1st nephropores on the margin of the velum, lateral to the 2nd pair of eyes; iv, 2-annulate between the ocular areolae containing the 3rd pair of eyes; v, 2-annulate above, a_1a_2 with the 4th pair of eyes = a_3 , a_1a_2/a_3 extending into the intermediate line, and uniannulate v forming the lateral and ventral margins of the sucker; vi, with the 1st complete series of somital sense organs, 3-annulate above, $a_1 = a_2$ with the 5th pair of eyes $< a_3$, a_1/a_2 extending into the ventral intermediate field, and vi 2-annulate below, $a_1a_2 > a_3$; vii, complete 3-annulate, $a_1 = a_2 = a_3$ (= viii a_1); viii, 4-annulate, $a_1 = a_2$ slightly $> b_5 = b_6$; ix to xxii 5-annulate (total 14); ix, $b_1 = b_2 < a_2 = b_5$ slightly $> b_6$, the second nephropores on b_2 ; x, $b_1 = b_2 < a_2 = b_5 = b_6$, as also xi and xii; xiii, $b_1 = b_2$ slightly $< a_2 = b_5 = b_6$; xiv to xvi, $b_1 = b_2 < a_2 > b_5 = b_6$; xvii to xix, $b_1 = b_2 < a_2$ slightly $> b_5$ slightly $> b_6$; xx to xxii, $b_1 = b_2 < a_2 = b_5 = b_6$; xxiii, $b_1 = b_2 < a_2 > a_3$, the 16th nephropores on b_2 ; xxiv, 2-annulate, $a_1a_2 = a_3$, an intermediate sense organ on the left, a_1a_2 the last annulus complete across the venter; xxv-vii, incomplete, transversely abbreviated, uniannulate; anus at the posterior margin of a supernumerary annulus.

Auricles, small, formed along the lateral edges of xxvi and xxvii; margined anteriorly by xxv; the lateral edge of the auricle with an anterior flange on xxvi separated from a posterior flange on xxvii by an open arch; the flange, roofing over a well formed chamber little deeper than the groove elsewhere between the posterior somites and the dorsum of the sucker.

Dorsum of the sucker with 5 concentric rings of areolae; ventral surface with a central papillate area about $\frac{1}{4}$ of the diameter of the sucker, and radiating muscular ridges dividing to terminate as about 80 at the margin.

Genital pores, xi b_5/b_6 ; xiii b_1/b_2 .

CENTRAL NERVOUS SYSTEM (Fig. 2A): The ventral component of the anterior ganglionic mass is compact, situated at the level of the anterior annuli in vii, with ganglion vii narrowly spaced from the ventral component and situated in the posterior annulus of vii. Ganglion viii is widely spaced from vii, posterior in somite viii at the level of b_5/b_6 ; ganglion ix, widely spaced from viii and at the level of a_2/b_5 in ix.

BODY WALL AND MUSCULAR SYSTEM: All three muscular layers in the body wall are individually distinct in dissection.

jaw; l.o., lambertian organ; m.p., male pore; nepr., nephropore; n.r., connectives of anterior ganglionic masses; ov., ovary; ovd.s., oviducal glandular sac; p.c., postcaecum; pm., paramedian somital sense organ; ph., pharynx; pr., prostate; pr.l., procurrent limb; re., rectum; re.l., recurrent limb; sbm., submarginal somital sense organ; sl.g.d., aggregated salivary gland ducts; sp.d., sperm duct; spm., supramarginal somital sense organ; te., testis; v.d., vas deferens; v.gl.m., ventral glandular mass of salivary glands; v.inm., ventral intermediate somital sense organ; vl.r., ventrolateral muscular ridge; v.pm., ventral paramedian somital sense organ.

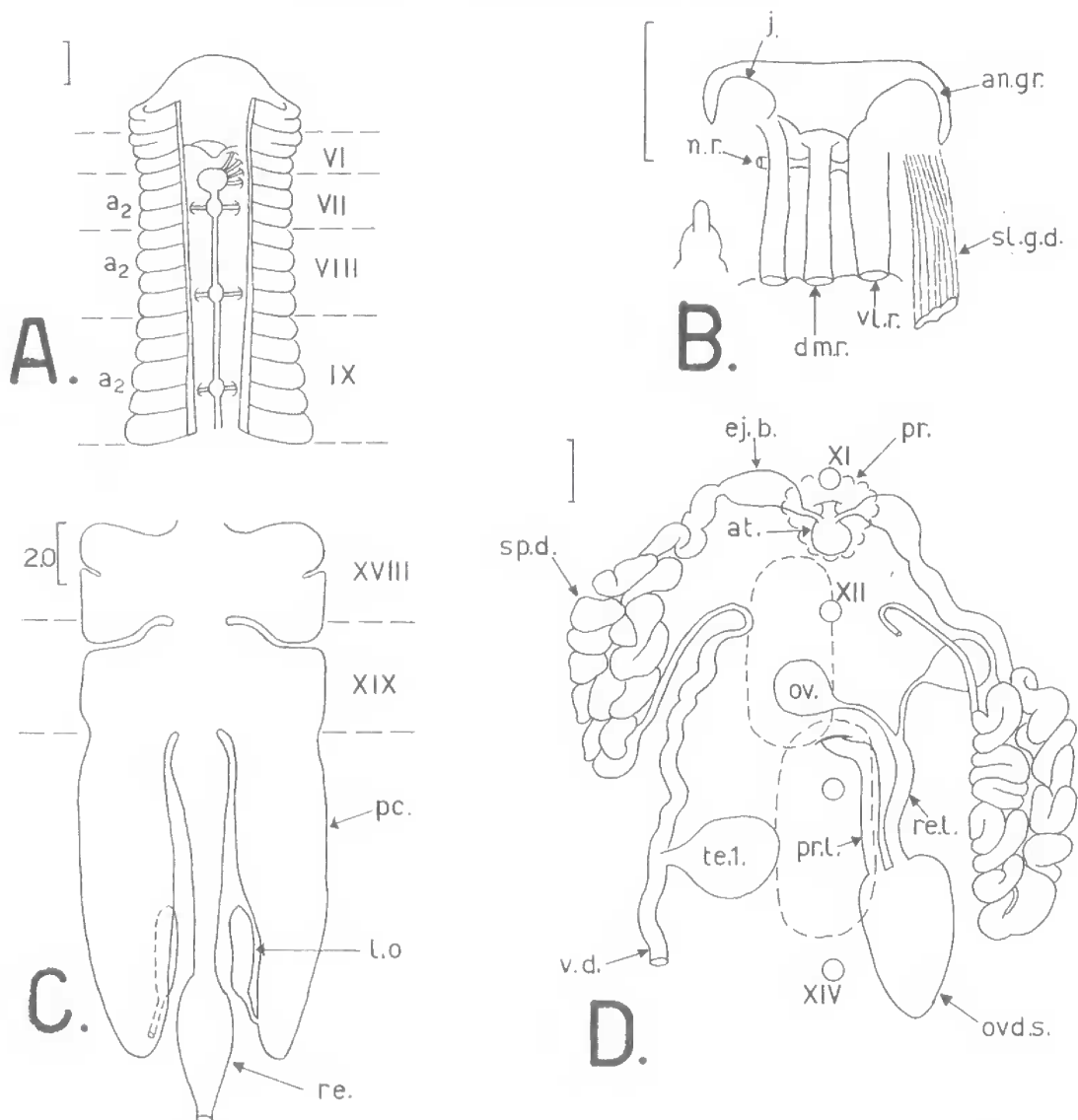


FIG. 2: *Amicibdella niger* gen. et sp. nov. Holotype. A, ventral aspect, somites v to ix opened by a median longitudinal incision to show the somital relationship of the ventral component of the anterior ganglionic mass and of ganglia vii to ix. B, pharynx opened along midventral line to show jaws, internal muscular ridges, column of aggregated salivary gland ducts. Inset, profile of median end of jaw. C, crop, engorged, caecation somites xviii, xix; lambertian organs; intestine; rectum. D, anterior region of male paired ducts, displaced laterally the broken lines indicating the original positions; male median region; female reproductive system.

For abbreviations, etc., see Fig. 1.

The paramedian palisades of dorsoventral muscles are obvious along the length of the crop only as clusters of strands at each intersomital level. In the intestinal region, the palisades are represented by three spaced flat pairs of strongly muscular bands, between the intestine and the postcaeca, and distinctly dorsoventrally oblique.

The bands appear to be at the intersomital levels: xx/xxi, xxi/xxii, xxii/xxiii.

Due to the greater development of these somites on the dorsal aspect, relative to the ventral aspect, with the dorsum longer than the venter, the dorsal end of each band is attached to the body wall at a level anterior to the ventral attachment, and since the ventral aspect narrows more rapidly than the dorsal, the dorsal ends are more widely spaced than the ventral.

In this way, the bands appear to be radiating from a limited ventral origin close to the base of the sucker, and more widely spaced at their dorsal insertions, as though possibly functional when the animal is erect.

The bands are adherent to the wall of the intestine in the preserved specimen.

The intermediate dorsoventral palisades are composed of a uniformly spaced series of individual strands.

ALIMENTARY TRACT (Figs. 2, B, C): The lower surface of the velum is smooth with a subcentral trifid opening, the apex ventral. The wall of the chamber of the sucker internal to this opening, is smooth, and terminates as a ridge forming the anterior wall of a distinct continuous annular groove, housing the jaws, and the posterior wall of the groove formed by the anterior end of the pharynx.

The jaws are transverse, subhorizontal, small, the base about 0.9 mm long, and the anterior end of the pharynx also carries a low obtusely triangular dorsomedian muscular pad and a similar pad in the ventromedian position, the pads much smaller than the jaws, the width not half of the length of the base of a jaw.

The entrance to the pharynx is very small, restricted, no wider than the dorsomedian pad; the wall weakly muscular, and the lumen tapering.

Each jaw and the muscular pads continue posteriorly as low undivided primary internal ridges on the wall of the pharynx. There are no salivary gland papillae on the jaws.

The pharynx terminates at viii/ix. The extrinsic radial musculature is an obvious system in vi, vii, viii, and in ix.

The engorged compartments of the crop obscure the distribution of the salivary glands. Very thick bands of aggregated ducts enter the jaws.

The caecation of the crop can only be assessed as each compartment with a pair of caeca at the anterior, and a second pair at the posterior levels; the pairs, equivalent; but this may not be correct since the postcaeca originate from the lateral aspects of the middle portion of the compartment in xix.

The postcaeca extend in the paramedian splanchnic chamber into xxiv.

The lambertian organs are ventral to the postcaeca; each elongate cylindrical, about 2.5 mm long and 0.5 mm wide; posterior in position, the anterior end at xxi/xxii; each longer than its duct which is about 1.0 mm in length and connects subterminally to the ventral face of the postcaecum. The lambertian organs are lined with a longitudinally rugose epithelium.

The intestine is compressed, tapering tubular, and connects terminally to the rectum at xxiii/xxiv.

REPRODUCTIVE SYSTEMS (Fig. 2D): Assessed as adult, male gravid.

Typically haemadipsoid; ejaculatory bulbs present.

Testes, saccular, the anterior pair at xiii/xiv, the posterior pair at xxii/xxiii, total 10 pairs; vasa efferentia, very short, connecting laterally to the white, thin-walled, tortuous vas deferens extending anteriorly in the paramedian splanchnic chamber to the middle of xii; reducing then to a thin-walled narrow tube which passes through the paramedian palisade, enters the median chamber, and is developed as a posteriorly directed primary loop in this chamber; a much folded sperm duct on the procurrent limb of the left loop, and on both limbs on the right loop; the relationship, tandem.

Each sperm duct terminates in a small opalescent, muscular, fusiform ejaculatory bulb, reducing abruptly into a short narrow ejaculatory duct entering the anterior aspect of the atrium. The atrium, minute, entirely ventral to the nerve cord, thin-walled, and amyomeric, micromorphic.

The whole female system is ventral to the anterior region of the male paired ducts.

The single pair of thin-walled saccular ovaries are posterior in xii; each continuing as a long narrow, thin-walled transparent oviduct; the oviducts joining to form the median region. There is no obvious female atrium. The median region is formed on a posteriorly directed primary loop reflecting at xiii/xiv.

The two limbs of the loop are essentially equal in length; the initial recurrent limb, a wide thick-walled tube; the terminal procurrent limb, wider than the recurrent limb, more strongly muscular, terminates at the genital pore. The oviducal glandular sac originates from the posterior aspect of the elbow of the loop, extends into the posterior half of xiv, as an inflated thin-walled sac with a glandular lining.

The prostatic tissue forms a large glandular mass ventral to the nerve cord, completely investing the male atrium, the ejaculatory ducts, and extends onto the terminal portion of the bulbs. There is no indication of albumin glands investing the median region of the female system.

DESCRIPTION OF PARATYPE

GENERAL FORM: At rest, 25.0 mm long, maximum width, 6.0 mm; full extension, horizontal, 45.0 mm, erect 35.0 mm. Preserved, 38.5 mm.

COLOUR: As in the type.

PATTERN: As the type, excepting the posterior end of the contrast stripe in the paramedian field is narrower but still includes the somital sense organs of the intermediate lines.

ANNULATION: Distinct supramarginal sense organs immediately lateral to the 2nd, 3rd, and 4th eyes. Nephropores, as in the type excepting nearly exactly at the level of the submarginal sense organs.

General somital annulation, as in the type, with a_2 distinctly the longest annulus in xii to xxii, $b_1 = b_2 < a_2 > b_5 = b_6$; xxiv, 2-annulate.

Auricle, the eave more extended than in the type; the notch deeper, wider; but the chamber beneath the eave no deeper than the groove lateral to xxiv.

ALIMENTARY TRACT: The anterior margin of the right ventrolateral jaw is 0.9 mm long; the medial portion, of the margin, convex, the lateral portion almost straight; teeth,

95 to 97, acutely conical and crowded along the medial half, progressively wider spaced reduced to be granular along the last quarter of the row; 0.016 mm tall at the medial end, the height diminishing uniformly and gradually along the row to be 0.014 mm in the middle of the row.

Differing from the type: the dorsomedian internal muscular ridge subdivided into two ridges, one wider; well-defined compartments on the crop in xiii to xviii, each with a single pair of long-based caeca originating along the middle level; xix, with long-based postcaeca extending posteriorly to xxiii/xxiv.

Lambertian organs as in type: the anterior end at xxii a₂, the posterior end at xxiii/xxiv, and the duct short, its length no more than the width of the organ.

REPRODUCTIVE SYSTEMS: As in type, excepting: the sperm ducts short; the primary loops on the anterior region of the male paired ducts, parallel in relationship; primary loop of the female median region reflecting in the middle of xiii, consequently the recurrent and procurrent limbs, short, but equal in length; the posterior end of the glandular sac at the level of ganglion xiv, and the sac relatively longer.

DISTRIBUTION

As known, northeastern Queensland, Cairns to Townsville, coastal into the Tablelands.

VARIATION IN PATTERN (Fig. 3)

For descriptive purposes, individual variation in pattern in the Haemadipsidae can be differentiated as:

A. Primary Variation: a deviation from a precisely defined topography, a band or contrast stripe extending into the lines of sense organs or into adjacent fields for one or a few somites; erratic; commonly asymmetric, occasionally symmetric; of such high frequency in some species as to be characteristic.

B. Secondary Variation: differing degrees in length or interruption and incompleteness of contrast stripes, or a combination of both; conforms to the defined topography; asymmetric, or some measure of symmetry when interruptions occur over the same annuli in somites; of such high frequency in some species as to be characteristic.

C. Tertiary Variation: forms of pattern appearing during growth; not constantly correlated with size; conforms to the defined topography; typically symmetrical; of such high frequency in some species as to be characteristic.

D. Pseudovariation: artefacts appearing in preserved specimens.

In *Amicibdella niger* primary variation has been seen in few specimens: the supra-marginal sense organs lateral to the narrow contrast stripe on a few mid-body somites, the stripe then in the intermediate field—Caribou Falls, 45.0 mm, xvii b₅ to xix b₂; a small gold patch within the ocular arch. Secondary variation is rare, one specimen with a break in a supramarginal contrast stripe for three somites on one side.

Pseudovariation is common, many preserved specimens showing a very pale narrow median band along the length of the body, the edges vaguely defined, the band related to

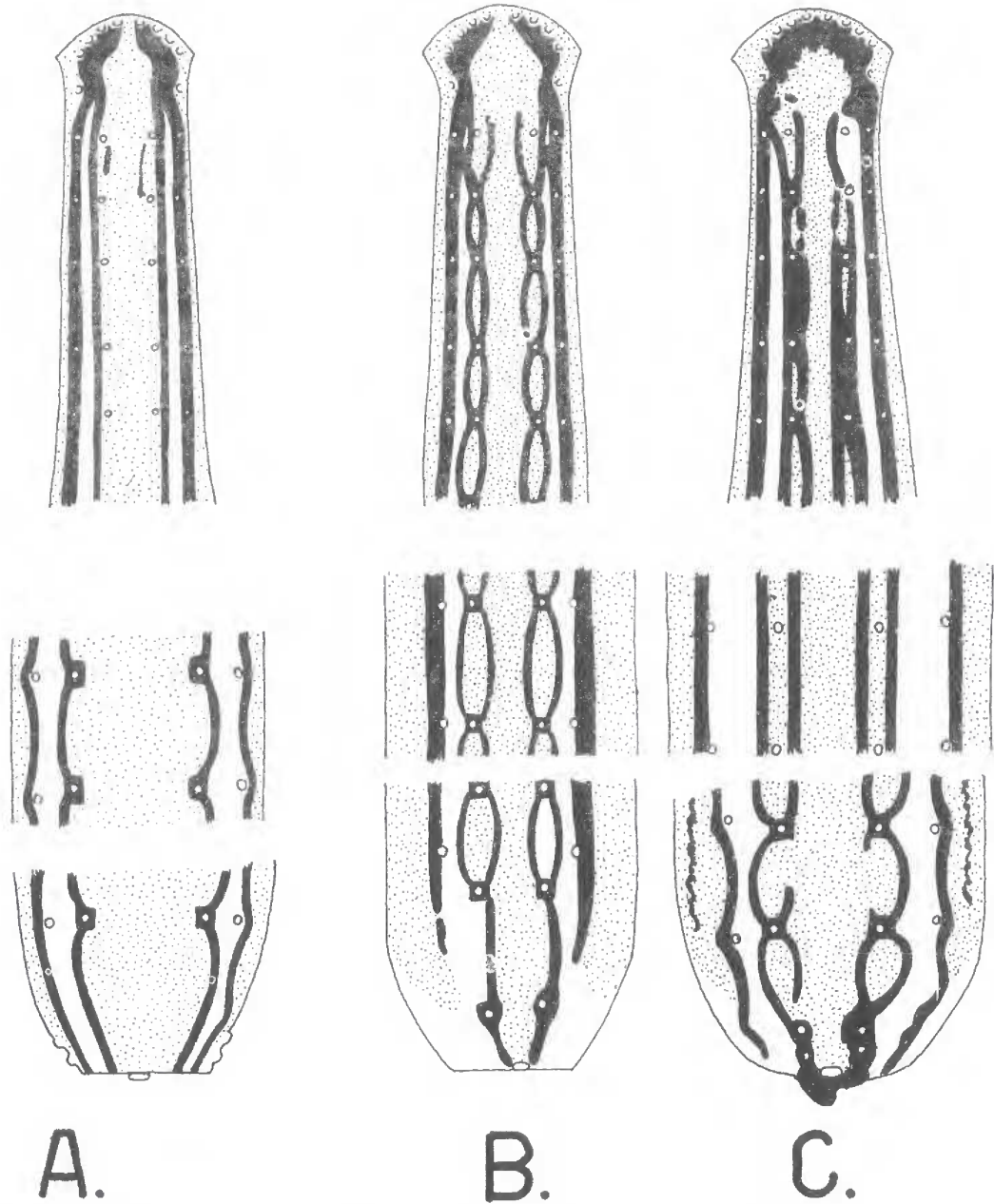


FIG. 3: *Amicibdella niger*. Tertiary variation in individual pattern in three specimens from Caribou Falls (v. Additional material, 3), shown at the same size for direct comparison. The lines of the paramedian and intermediate sense organs; stipple indicating the pale brown of the body of bands in the median, paramedian and intermediate fields; black, the dark brown margins on these bands, the dark brown line medial to the paramedian sense organs, and dark brown areolae including these sense organs; contrast stripes of the paramedian fields, white.

A, 28.0 mm, Unistriate along the length of the body; above, anterior region of the body back into xi; middle, xvii and xviii; below, posterior region of body, xxii to xxvii. B, 31.0 mm, the same, Catenulate along the length of the body. C, 45.0 mm, the same, Bistriate fused anteriorly, Catenulate on the posterior somites.

the absence along this line of the very dark internal botryoidal tissue and a thin body wall.

Tertiary variation has a very high frequency in *A. niger*, commonly very obvious in preserved specimens; only occasionally detectable in the living specimen.

It has three forms:

(a) Unistriate: a wide pale band extends across the dorsal median field to terminate in the paramedian field with a narrow dark margin. This form is general in specimens less than 30.0 mm and occurs also in larger specimens.

In others, less than 30.0 mm to full size, a second dark line is present. This is medial to the line of paramedian sense organs and is of the width of the line lateral to them. This provides two forms, one or the other, or in combination in the one specimen; the resultant, essentially symmetrical.

(b) Bistriate: the two dark lines parallel, the paramedians in a pale band between them; the dark lines may widen, the pale band narrow, or fuse to include the sense organs.

(c) Catenulate: the paramedian sense organs each in a dark areola; the two lines converging and connecting to the areolae, diverging between the areolae, and 'chain-like' in appearance.

AMICIBDELLA NIGER: ADDITIONAL MATERIAL

In all of the following, the annuli of the midnephric somites show differences in length with a_2 distinctly long.

(1) 3 specimens, 16.0, 20.0, 48.0 mm. Ridge above Christie's Pocket, due W. of Thornton's Peak, Q., Rainforest; June 16, 1973; Collector, J. W. Winter.

16.0 mm, unistriate; 20.0 mm, catenulate along the greater length of the body; 48.0 mm, bistrate anteriorly, the paramedian organs each in a dark areola, then catenulate back to xxi.

(2) 5 specimens, 18.0, 25.0, 32.0, 34.0, 52.0 mm. Townsville, Q.; August, 1968; collector, M. J. Grice.

18.0 mm, catenulate in xv to xviii; 25.0, catenulate ix to xvii; 32.0 mm, bistrate, the dark lines broad, female pore in xiii b_2 ; 34.0 mm, as 32.0 but catenulate from in xix to in xxvi; 52.0 mm, engorged, catenulate xviii to in xxiv.

Colour in life: As in type.

(3) 6 specimens, 28.0, 28.0, 30.0, 31.0, 45.0, 53.0 mm. Caribou Falls, near Lake Eachem, N. Queensland; August 31, 1969; collector, North Queensland Naturalists Club, Cairns.

Colour in life, as in type. Pattern (Fig. 3). Preserved in alcohol, the paired contrast stripe is defined below only by a maculate line separating the margin from the venter.

(4) Two specimens, 21.0, 32.0 mm. Tinaroo Creek, near Mareeba, N. Q.; Alt., 3,000 ft.; collector, North Queensland Naturalists Club, Cairns.

In life, 32.0 mm, generally dark brown, a paler brown band in the median field; bistrate, the lines partly fused from xii to xv, catenulate from xv to xxiv; the stripe of the supramarginal line extending briefly into the marginal field; venter, sparsely maculate.

(5) Four specimens, 19·0, 29·0, 50·0, 57·0 mm. No locality; August 11, 25, 1968; collector, North Queensland Naturalists Club, Cairns.

19·0 mm, viii to xii unistriate, xii to xvi bistrigate, xvii to xxii catenulate; 29·0 mm, paramedian sense organs in brown areolae, bistrigate, partly fused from xi to xv, catenulate to xxiv; female pore, xiii b₂; 50·0 and 57·0 mm, unistriate for the length of the body.

The 50·0 mm specimen has 4 small opaque white subspherical bodies, each about 0·20 mm in diameter, visible through the ventral body wall. They are erratic anatomically, and have the general appearance of parasitic cysts.

(6) One specimen, 29·0 mm. Broomfield Swamp, Atherton Tableland; in cleared rainforest, near a swamp; June 3, 1969; collector, B. Hyland; per. P. Ogilvie.

Preserved, very pale brown, the dorsal band, greyish, unistriate with some very weak indications of the dark line medial to the paramedian sense organs.

(7) One specimen, 29·0 mm. Forest Patch on Roaring Meg, North Daintree River, N. Queensland; June 17, 1973; collector, J. W. Winter; preserved, brown, pattern complete, catenulate viii to xxiii.

(8) Two specimens, curved, approx. 17·0, 23·0 mm. Grassy woodland, 800 to 1,200 ft. Gold Hill, end of ridge W. from Thornton Peak and Enterprise Mine; June 18, 1973; collector, J. W. Winter; preserved in formalin, pattern complete.

17·0 mm, bistrigate vii to xv, then catenulate; a few supramarginals lateral to the stripe in the midbody; 23·0 mm, catenulate viii to xi and xix to xxiii, bistrigate between xi and xix.

Micobdella gen. nov.

DERIVATION: *micere*, to move to and fro with a rapid motion; *bdella*, a leech. m.

Haemadipsidae; duognathous; lacking salivary gland papillae; somites viii to xxiii 4-annulate (total 16); xxiv, uniannulate; 6 annuli posterior to xxiii a₂; auricles, small, posterior to xxiv, the margin very weakly lobed; a contrast stripe in the dorsal median field from ii/iii into xxvii; a contrast stripe lateral in the intermediate field from in vi to in xxvii also includes the line of the supramarginal sense organs, and has straight edges; 1st nephropores lateral on iv, 2nd to 16th nephropores ventral in the marginal field, and included in the band in this field; jaws edentulous, each armed with a continuous low cutting edge; pharynx terminates at viii/ix; crop compartments each with a single pair of wide based caeca at the median level; lambertian organs in xxi to in xxii, elongate cylindrical, the organs shorter than the ducts; genital pores, xi b₅/b₆, xii b₅/b₆; reproductive systems, haemadipsoid: anterior regions of male paired ducts reflected in a single primary loop in the median splanchnic chamber, a sperm duct on the posterior halves of both limbs of the loop, ejaculatory bulbs present, weakly muscular; median regions, hemimyomeric, the male a micromorphic atrium, the female formed on a posteriorly directed loop, the limbs of the loop equal in length, and the loop extended posteriorly as an oviducal glandular sac.

TYPE SPECIES: *Micobdella gloriosi* sp. nov. as below.

OTHER SPECIES: *Micobdella auritus* sp. nov.

Micobdella is characterized in the combination of a general somital annulation as in *Philaemon* and other 4-annulates of eastern Australia; a contrast stripe along the length of the dorsal median field; a contrast stripe along the length of each intermediate field including the line of supramarginal somital sense organs; the jaws armed with a continuous cutting edge.

With the exclusion (Richardson, 1969) of the neotropical *Nesophilaemon* Nybelin 1943 from the Haemadipsidae, the previously established 4-annulate genera in the family are: *Philaemon* Lambert 1898; *Tritetrabdella* Moore 1938; *Neoterrabdella* Richardson 1969.

Tritetrabdella is based on a species from the Malay Peninsula: viii to xxii 4-annulate; trignathous, the jaws with 45 teeth; no salivary gland papillae; no lambertian organs. The pattern is not topographically defined.

Neoterrabdella is based on a species from the Northern Territory: viii to xxiii 4-annulate; xxiv 3-annulate; 8 or 9 annuli posterior to xxiii a₂; large lobed auricles formed on xxiv to xxvii; jaws, duognathous, with teeth; pattern: longitudinal contrast stripes—the middle half of the dorsal median field from ii/iii to xxvii, on each line of paramedian sense organs from in viii (or shorter, in ix, or in xii) to xxiv a₂, median in each paramedian field from in vi to xxiv a₂, median in each intermediate field from in ix to in xxiv a₂, and in each marginal field from the velum onto the auricle; nephropores in the marginal fields; no salivary gland papillae; no lambertian organs. This combination has not been seen in any 4-annulates from eastern Australia or Papua.

Philaemon is based on specimens probably from southern Victoria, possibly from Tasmania, the type species being *Philaemon pungens* as described by Lambert (1898). From Lambert, the characteristics are: viii to xxiii 4-annulate; xxiv, uniannulate; 6 annuli posterior to xxiii a₂; genital pores, xi b₅/b₆, xii b₅/b₆; auricles, posterior to xxiv; duognathous, with 'some seventy or more small teeth'; no salivary gland papillae (v. pl. xi. figs. 10 to 12); lambertian organs in xx and xxi, the organ about half the length of the duct; pattern: a pale brown band filling the median field from in vi a₂ to in xxvii; contrast stripe (green in life) along each line of paramedian sense organs from in vi a₃ to xxiii/xxiv, the stripe distinctly and regularly narrowed on a₂ in each somite; a stripe in each marginal field at least from in x to the auricle; location of the nephropore, ?.

The combination of characteristics as in *Philaemon* is found in 4-annulates from North Queensland to Tasmania. These constitute a complex assembly, as yet confusingly similar in pattern and external meristic morphology, such that I continue unable to sort them with any confidence.

One from Mount Glorious, southeast Queensland, differs in having also a contrast stripe in the lateral half of the intermediate field, the stripe extending to include the supra-marginal sense organs; genital pores, xi b₆, xii a₂. It is brown in general colour, small, the largest specimen to date, 14.0 mm long.

Additional to the above, a new genus in Papua is based on a troglobitic 4-annulate lacking cutaneous pigment and pattern: the 1st nephropore on viii a₁; viii to xxiii 4-annulate; 6 annuli posterior to xxiii a₂; lambertian organs in xxi and xxii, the organ much longer than the duct (as in 5-annulates); recurrent limb of the female median region, short, about half the length of the procurrent limb, etc.

***Micobdella gloriosi* sp. nov.**
(Figures 4, 5)

HOLOTYPE: Preserved, 55.0 mm long. Mt Glorious, SE. Queensland; rainforest; Feb. 28, 1972; collector, A. Hiller; per C. Wallace. Dissected, jaw removed, mounted separately. Deposited, Queensland Museum, G5309.

PARATYPE: Preserved, total length 55.0 mm. Same locality, date, collector, as type. Dissected: Deposited Australian Museum, Sydney, W4306.

DESCRIPTION OF HOLOTYPE

GENERAL FORM (Fig. 4 A): Preserved, elongate, slightly depressed; widest posteriorly, the width diminishing gradually anteriorly to the base of the narrow anterior sucker; more rapidly posteriorly to the base of the posterior sucker which is nearly as wide as the widest portion of the body.

Total length, 55.0 mm; the width at v/vi, 3.0 mm; the width and depth, 3.0 mm at ix/x, 8.0 mm from the anterior tip of the animal; 4.0 mm and 3.0 mm at xi/xii, 14.0 mm; 6.0 mm and 5.0 mm at 20.0 mm; 8.0 and 5.0 mm, at 30 mm; 7.5 mm and 5.0 mm, at xx/xxi, 40.0 mm; the base of the posterior sucker, 5.0 mm at 53.0 mm; and the sucker 7.0 mm wide and 9.0 mm long.

COLOUR: In life: the dorsum a deep dark brown sparsely maculate with black so as to be dusky; divided into a pair of dark bands by a continuous longitudinal brightly yellow median stripe along the full length of the body, and a single pair of continuous longitudinal brightly yellow stripes. The paired stripes divide the dorsum from the light brownish immaculate venter. Dorsum of the posterior sucker, immaculate pale grey.

Preserved in formalin: the dorsum diminishes to a pale brown excepting along the margins of the bands which are dark brown; contrast stripes diminish to off-white or pale cream; the venter to dusky faintly brownish pale grey. The narrow lower margin to the lateral stripe weakens to become broken, even difficult to detect.

PATTERN (Fig. 4, B to E): Preserved: the median contrast stripe is continuous from ii/iii, immediately behind the 1st pair of eyes into xxvii, reaching to and enclosing the anus. It almost fills the median field from ii/iii to v; elsewhere uniformly restricted to the middle half of the median field which is completed by the narrow medial dark margins of the dorsal bands. The medial margin of this band includes the line of the paramedian sense organs; the paler portion of the band occupies the paramedian field and the line of the intermediate sense organs; and the outer dark margin of the band is in the intermediate field, close to the line of intermediate sense organs in the pregenital region, progressively further from this line as the field widens along the genital and postgenital regions, with the greater part of the medial half of the field then occupied by the paler portion of the band.

The single pair of contrast stripes are narrow; commence immediately lateral to the 5th eye on vi, enclose the supramarginal sense organ close to the edge of the stripe. The stripe continues posteriorly in this relationship, occupying the lateral half of the intermediate field, the line of the supramarginal sense organs just within the outer edge of the stripe.

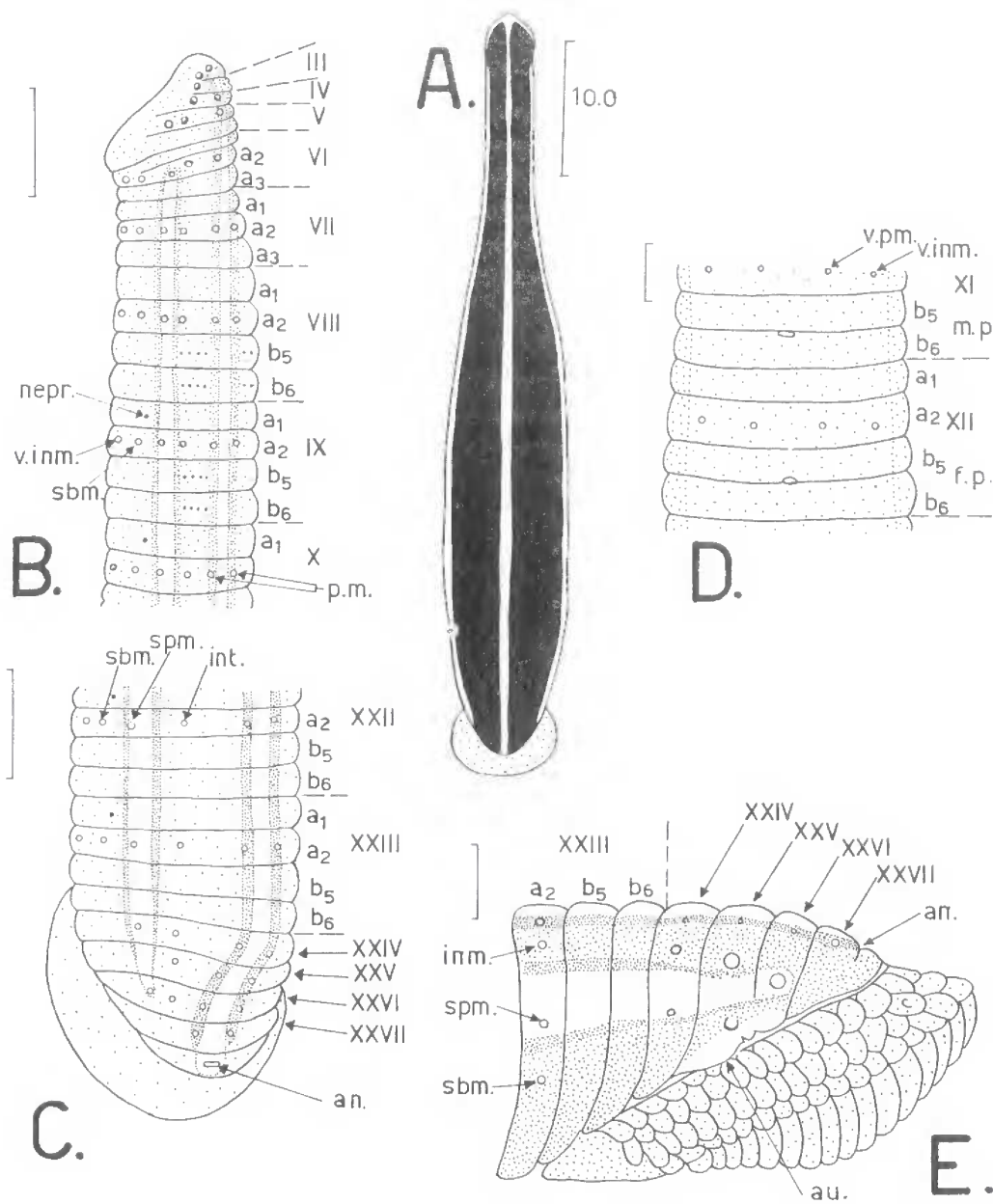


FIG. 4: *Micobdella gloriosi* gen. et sp. nov. Holotype. A, general form and dorsal pattern, contrast stripes in the median and intermediate fields. B, left dorsolateral aspect, somites i to ix, showing somital annulation and topography of pattern. C, the same, for somites xxii to xxvii. D, ventral aspect, somites xi and xii. E. Left lateral aspect, somites xxiii to xxvii, dorsum and ends of ventral muscular ridges on sucker, topography of pattern, and morphology of auricle.

For abbreviations, etc., see Fig. 1.

In this way, both edges of the paired contrast stripes are straight, and the stripe uniform along the greater length of the body.

The paired contrast stripes divide the dorsal pattern from the marginal and ventral pattern, which is uniform excepting the narrow dark margin dorsal in the marginal field.

The dark margins of the bands narrow behind xxiii.

The paired stripes continue posterior to this, reducing in width and terminate enclosing the supramarginal sense organ on xxvi.

There is no indication of pattern on the dorsum of the posterior sucker.

ANNULATION (Fig. 4, B-E): Interannular and intersomital furrows equivalent; somital limits not directly recognizable; no obvious couplets or triplets of annuli; somital sense organs, in life everywhere encircled in white and obvious, preserved, frequently obscure, detectable with difficulty; sensillae, obvious as small white points, relatively few in all fields; annuli, strongly areolate in life, areolae detectable only in the ocular somites in well extended specimens; nephropores obvious in life as small dark points central in the length of a_1 , in the marginal field just dorsal to the level of the submarginal sense organ on a_2 .

Fully extended, ii/iii is the first recognizable furrow, weak, restricted to the median field, with the 1st eyes anterior to it; iii, uniannulate with the 2nd pair of eyes; iii/iv, stronger, terminating in the intermediate lines; iv, uniannulate, with the 3rd pair of eyes and 1st detectable paramedian sense organs; v, 2-annulate, $a_1 a_2 = a_3$, the 4th pair of eyes in $a_1 a_2$ as also the 1st detectable supramarginal sense organs, $a_1 a_2 / a_3$ terminating at the level of the submarginal line, and v forming the posterior portion of the surface of the velum and extending ventrally as the lateral and ventral margin of the sucker; no defined dorsolateral lobe on the margin; the 1st nephropore on the lower surface of the velum close to the lateral margin at the level of v $a_1 a_2 / a_3$; vi, 3-annulate above, $a_1 < a_2 < a_3$, a_2 with the 5th pair of eyes and the 1st complete set of somital sense organs, a_1 / a_2 extends into the ventral intermediate field, and below this, vi 2-annulate, $a_1 a_2 > a_3$; vii, complete 3-annulate, $a_1 < a_2 < a_3$ ($a_3 =$ viii a_1); viii to xxiii 4-annulate (total 16); viii, a_1 slightly $> a_2 = b_5 = b_6$; 2nd nephropore on ix a_1 ; ix to xx, $a_1 = a_2 = b_5 = b_6$, with b_6 slightly shorter than b_5 but the difference is so small that b_6 is not directly recognizable by length alone; xxi, $a_1 < a_2 = b_5 = b_6$, as also xxii; xxiii, $a_1 = a_2$ slightly $> b_5 = b_6$; 6 annuli posterior to xxiii a_2 ; xxiv to xxvii, uniannulate; xxiv, complete across the venter, but reduced, and carrying minute white dorsal paramedian, slightly larger intermediate and supramarginal somital sense organs; xxv and xxvi with minute paramedians and large obvious intermediate sense organs; xxvii, with minute paramedians, followed by a supernumerary annulus nearly divided by the anus.

Auricles distinctly small; the eave, narrow, differentiated as a thick flange on the edge of xxv, longer than a thin flange on xxvi, the two separated by a notch; no differentiated eave on xxvii; the groove between the eave on xxv and the dorsal surface of the sucker not appreciably deeper than the groove beneath xxiv. In life, the 17th nephropore elevated on a papilla below the notch in the eave; preserved, the papilla fully retracted and the nephropore a minute aperture on the inner wall of the groove.

Dorsum of the posterior sucker divided into about five concentric rows of areolae;

the venter with a prominent clamp, the surface divided into radiating muscular ridges which subdivide to end as about 80 at the margin of the sucker.

BODY WALL AND MUSCULATURE: The body wall thin, only the inner layer of longitudinal muscle strands detectable in dissection.

Paramedian palisades of dorsoventral muscles represented along the crop by small clusters at the intersomital levels. Posterior to xix/xx, four pairs of strong bands on each side of the intestine, serial, apparently intersomital, the pairs reducing in length posteriorly; the dorsal ends attached to the body wall anterior to and more widely spaced than the attachment to the ventral body wall where the ends are closely approximated. In this way the bands appear to rise from a common ventral attachment and radiate to individual spaced attachments on the dorsal body wall.

Intermediate palisade, uniformly spaced strands back to xx. Posterior to this, three pairs of distinct bands, much narrower than the paramedian bands, are closely approximated in their ventral attachment and more widely spaced dorsally.

CENTRAL NERVOUS SYSTEM (Fig. 5 A): The anterior ganglionic mass has right and left small dorsolateral components well spaced from the compact bilobed ventral component which innervates the velum, at least somites iii and iv, v and vi.

Ganglion vii in intimate contact with the ventral component and widely spaced from viii which is at the level of viii_b₅.

ALIMENTARY TRACT (Fig. 5, A–C): The lower surface of the velum inflated, smooth, with a median subcentral trifold aperture; the rim of the aperture forming the anterior edge of a wide deep annular groove on the inner wall of the chamber of the sucker, the posterior wall of the groove formed by the anterior end of the pharynx; the groove, undivided excepting partially ventrally by a ventromedian thickening on the end of the pharynx.

Duognathous; dorsomedian and ventromedian muscular pads on the end of the pharynx; the ventrolateral jaws housed in the annular groove, horizontal, the obtuse convex anterior margin 0.75 mm long, the profile at the median end, obtusely convex, as tall as wide (0.5 mm) at the base.

The right ventrolateral jaw removed. Under high power, no indication of teeth; the edge armed with a thin low ridge, a cutting edge, 0.73 mm long, highest (0.03 mm) at the medial end, reducing gradually in height along its length to be 0.02 mm in the middle.

No salivary gland papillae on the jaws.

The entrance to the pharynx, narrow, restricted, not half the length of the anterior margin of the jaw, and closely embraced by the connectives between the dorsal and ventral components of the anterior ganglionic masses.

The wall of the pharynx, thin; internal muscular ridges present as undivided dorso-medial, ventromedian, and ventrolateral ridges; no dorsolateral ridges.

Salivary glands, sparse aggregations in vii, viii, and ix, and a compact ventral mass on each side posterior in viii; the ducts joining on each side to form heavy columns of aggregated ducts terminating in the jaws.

The pharynx supported by an obvious system of extrinsic radial muscles, terminates at viii/ix.

The crop thin-walled, narrowly tubular without obvious compartmentation in ix and x; then partly filled with blood, the compartments each extended laterally with a single pair of wide based simple caeca at the median level in xi to xviii; xix, with postcaeca originating from the anterior half of the compartment, the postcaeca entering the paramedian splanchnic chambers and extending posteriorly into xxiii; the outer aspect of the postcaeca, lobed.

Lambertian organs located in the paramedian chambers ventral to the postcaeca; the organs from in xxi to in xxii; elongate cylindrical, continuing as a very narrow duct connecting terminally to the postcaeca; the organs distinctly shorter than the ducts, about one third the length of the duct.

The crop terminates at xix/xx, connecting terminally to the tubular intestine which shows no indication of anterior caeca, and joins at xxii/xxiii to the end of the tubular tapering rectum.

REPRODUCTIVE SYSTEMS (Fig. 5D): Assessed as male mature.

Typically haemadipsoid; ejaculatory bulbs present.

Genital apertures, xi b_5/b_6 , xii b_5/b_6 .

Testes, saccular, the anterior pair at xiii/xiv, the posterior pair at xxii/xxiii, total 10 pairs; vasa efferentia, short, connecting laterally to the white tortuous vas deferens extending anteriorly in the paramedian splanchnic chamber, reducing in width in xiii, and entering the median chamber at xi/xii, developed here as a simple posteriorly directed loop, the two in parallel; a much folded sperm duct occupying the posterior half of the recurrent limb of the loop and of the procurrent limb; terminal portion of the procurrent limb narrowly tubular, terminating as a small elongate opalescent muscular ejaculatory bulb; the bulb continues as a very short ejaculatory duct, the two ducts entering independently into the anteroventral aspect of the male atrium; male atrium thin walled, small, standing just above the level of the ventral cord, amyomeric, micromorphic.

The single pair of small saccular ovaries, posterior in xii, each continuing as a short narrow delicate oviduct; oviducts joining just anterior to the female pore to form the median region; no distinct female atrium; median region formed on a posteriorly directed primary loop reflecting in xiv, the two limbs of the loop essentially equal in length; the initial recurrent limb, thick walled, narrower than the strongly muscular procurrent limb; the posterior wall of the elbow of the loop expanded as a thin-walled glandular sac extending into xv.

Prostatic tissue, a large glandular mass in xi a_2 to xi/xii, adherent to the ventral body wall, enclosing and concealing the atrium, the ejaculatory ducts and the terminal ends of the bulbs.

There is no glandular tissue recognizable as albumin glands.

DISTRIBUTION

Eastern Queensland: Cairns; Mount Glorious, Brisbane.

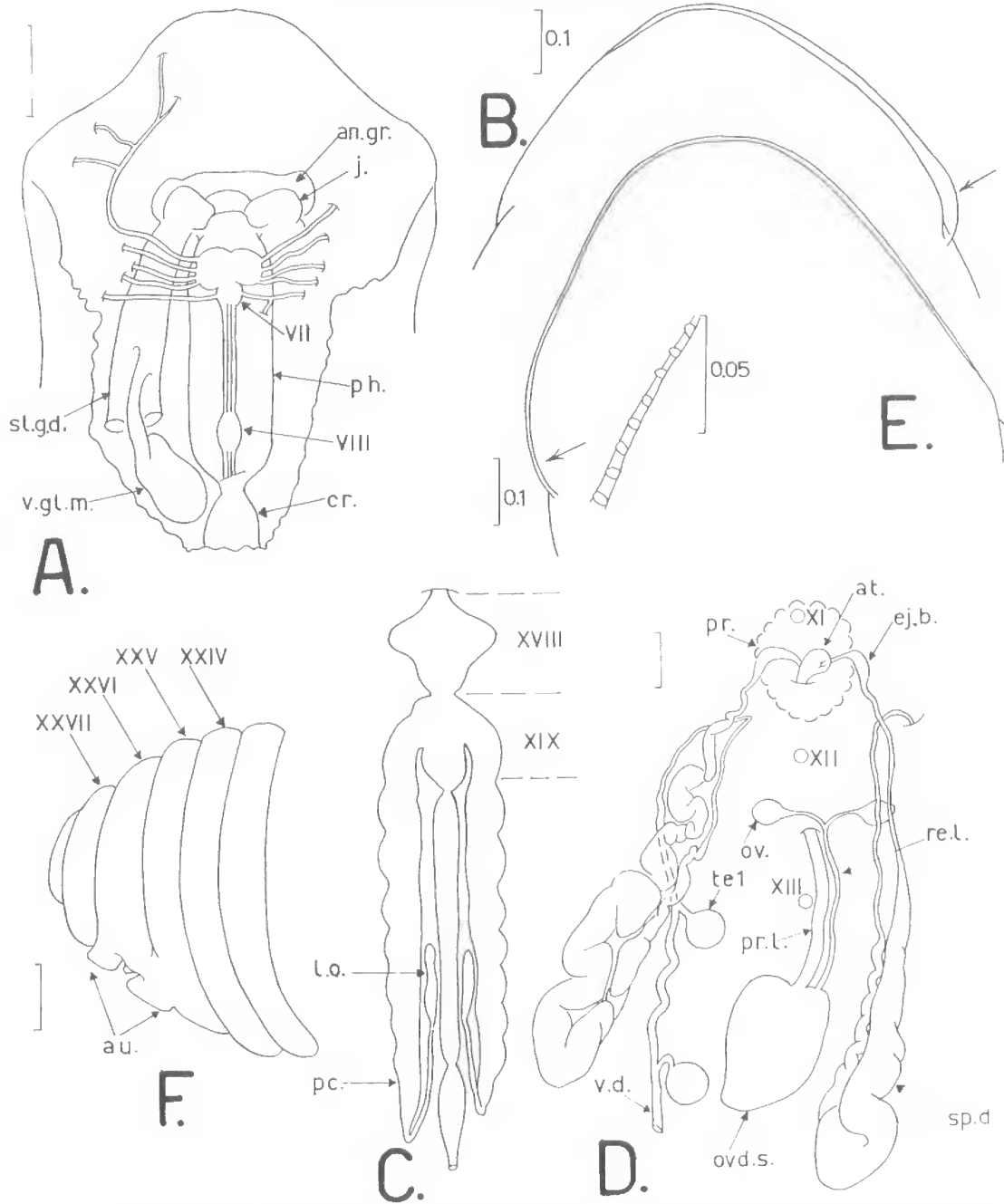


FIG. 5: A–G, *Micobdella gloriosi* gen. et sp. nov. Holotype. A, anterior ganglionic mass, somital ganglia vii and viii, jaws, pharynx, aggregated salivary gland ducts and ventral glandular mass as exposed by a median incision along the ventral aspect. B, jaw and cutting ridge, arrow marks medial end. C, caecation of crop, somites xviii and xix, lambertian organs and ducts, intestine, rectum. D, E, F, *Micobdella auritus* sp. nov. Holotype. E, jaw with cutting ridge, arrow marks medial end. Inset, minute teeth of the medial end of the anterior margin of the jaw. F, right lateral aspect xxiv to xxvii, and the auricle.

ADDITIONAL MATERIAL

One specimen, 34.0 mm, Under a log, Road A, about two miles from Tinaroo Lake, near Atherton, N. Q.; Nov. 7, 1971; collector, North Queensland Naturalists Club, Cairns.

Sent alive, dead and desiccated on arrival. Placed on damp filter-paper, recovered form, colour and pattern.

Colour, as type. Preserved, dorsal bands, pale brown with narrow black margins; contrast stripes, cream; venter white, immaculate, with an incomplete narrow pale brown margin in the marginal field.

Pattern, general somital annulation, genital pores, nephropores, auricles, as type.

Somites xvii, xviii, the annuli essentially subequal in length, a_1 and b_6 slightly $< a_2 = b_5$, but not regularly so along the midnephric series.

***Micobdella auritus* sp. nov.**
(Figures 5 E, F)

HOLOTYPE. Total length, 67.0 mm. Killara, Sydney, N.S.W. (Moist valley); July 7, 1973; collector, Glen Hunt; per Dr P. Hutchings. Dissected, one jaw removed, mounted separately. Deposited, Australian Museum, Sydney, W5537.

DESCRIPTION OF HOLOTYPE

GENERAL FORM: A large 4-annulate land-leech, the size and general form as in *M. gloriosi*.

COLOUR: In life: margin of the velum pale grey; dorsum of the velum and of the body, intense black; contrast stripes, golden, tinged with green anteriorly; somital sense organs obscure; venter, dark red, immaculate, excepting large dark brown maculae just ventral to the outer paired stripes, each macula restricted to an annulus; dorsum of the posterior sucker, immaculate pale grey, the venter off-white.

Preserved in formalin: the dorsum remains black excepting posterior to xxiii which becomes pale reddish; the green tinge fades from the contrast stripes which become pale yellow; the venter and the maculae diminish in intensity.

PATTERN: As in *M. gloriosi*: a median dorsal contrast stripe with sharply defined parallel edges occupies the middle third of the median field from ii/iii to in xxvii, uniform in width along the greater length of the body, slightly wider anterior to viii; a single pair of contrast stripes with sharply defined parallel edges, each occupying the lateral half of the intermediate field and the line of supramarginal sense organs from in vi a_2 , lateral to the 5th eye, to xxiv/xxv; nephropores below the stripe close to the line of submarginal sense organs.

ANNULATION: General somital annulation as in *M. gloriosi*. Somital annulation differs: iv, 2-annulate between the ocular areolae; vi, $a_1 < a_2 < a_3$ above; viii, $a_1 > a_2 < b_5 = b_6$; ix, $a_1 < a_2 < b_5 = b_6$; x, $a_1 = a_2 < b_5 = b_6$; xiii to xvi, $a_1 = a_2 = b_5 > b_6$; xvii, xviii, xix, $a_1 < a_2 > b_5 = b_6$; xx, xxi, $a_1 = a_2 < b_5 > b_6$; xxii, xxiii, $a_1 = a_2 > b_5 > b_6$; xxiii b_5 , last annulus complete across the venter, b_6 reduced to a very thin ridge. A supernumerary annulus divided by the anus.

The relative lengths of the annuli in ix to xx are distinct, and fully recognizable.

Auricles, short, as an eave formed on the lateral ends of xxv and xxvi, terminating at xxiv/xxv and xxvi/xxvii, divided by a notch; the eave covering a groove no deeper than the groove beneath the end of xxiv; the eave more prominent than in *gloriosi*.

Genital pores, xi b_5/b_6 , xii b_5/b_6 .

ALIMENTARY TRACT: Velum, annular groove, housing of the jaws, entrance to the pharynx, the pharynx, crop, and intestine, as in *M. gloriosi*.

Jaws, compressed, taller, more convex along the anterior margin than in *gloriosi*. The anterior margin 1.4 mm long; minute, obtuse, low conical, blunt teeth 0.006 mm high, spaced at intervals of 0.01 mm, detectable along the medial portion for a distance of 0.4 mm, and a low cutting ridge of about the same height along the rest of this margin. The teeth are of such small size and stand at varying angles as though non-functional. No salivary gland papillae.

Lambertian organs in xxi and xxii, elongate cylindrical, each much shorter than its duct.

REPRODUCTIVE SYSTEMS: As in *M. gloriosi*. Assessed as male gravid. The sperm ducts occupy almost the entire length of both limbs on the primary loop. The two loops are parallel in relationship.

M. auritus differs from *gloriosi* in having a_2 and/or b_5 distinctly long in somites xiii to xxiii; in having minute (? non-functional, vestigial) teeth along a short portion of the anterior margin of the jaw additional to the cutting edge; and in being black on the dorsum, the black remaining through early preservation.

DISTRIBUTION

Known only from the holotype. This species has not been represented in the many other collections I have examined from south of Sydney, the Northern Rivers Region in N.S.W., or Queensland.

ADDITIONAL MATERIAL

Micobdella sp.? One specimen, 44.0 mm long. Tasmania. National Museum of Victoria, Melbourne, G852. (There is no other information).

Large, heavy-bodied; preserved in alcohol; faded; unsuitable for dissection.

General form, pattern and topography of pattern, general somital annulation, as in *Micobdella*.

Narrow brown lines define the edges of the contrast stripes, the median from in iii to in xxvii; the dorsal edge of the paired stripes from in viii (left), in ix (right), to in xxiv; venter immaculate.

The topography of the pattern is shown clearly in xxiii as: a contrast stripe occupying the middle half of the dorsal median field; the paired contrast stripes as in the lateral half of the intermediate field with the supramarginal sense organ immediately within the edge of the stripe; the nephropores in the marginal field immediately dorsal to the level of the submarginal sense organ.

The auricle, very small, a longer flange on xxv separated by a notch from a small flange on xxvi; the eave compressed and hardly recognizable.

Somites xv to xxi, $a_1 = a_2 = b_5 > b_6$; xxii, $a_1 = a_2 = b_5 < b_6$; xxiii, $a_1 > a_2 > b_5 = b_6$. In this G852 resembles *auritus* and differs from *gloriosi*. It differs from the 4-annulates previously recorded from Tasmania, *Philaemon pungens* Lambert 1898 and *P. grandis* Ingram 1957, both having a contrast stripe along the lines of the paramedian sense organs.

Although unsuitable for dissection, the jaws grossly contracted and unusable for detail, the combination of the somital annulation and the distinctive topographic pattern of *Micobdella* indicates that the specimen can be assigned with reasonable confidence to this genus.

I have had no other material from Victoria or Tasmania assignable to *Micobdella*; but with the experience of a single specimen from Sydney as the only evidence in many collections of this genus outside of Queensland, its occurrence in Tasmania cannot be seen as improbable.

G852 is not fully documented. Lambert's material of '*Geobdella australiensis*' and '*Geobdella whitmani*' carry the collection numbers G831 to 833 on printed labels with writing in the same hand as for G852, which may be only a coincidence of cataloguing such as happens with the use of a new label. At least there is this evidence that material had come to the National Museum from southern Queensland and from central eastern N.S.W.

For this reason, it seems best to accept the record of *Micobdella* as in Tasmania, as provisional.

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